



# AN IDSS APPROACH TO WFO AVIATION

BEST PRACTICES FOR WRITING TAFS AND  
UNDERSTANDING THE IMPACT TO OUR AVIATION PARTNERS

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SOUTHWEST AVIATION WEATHER SAFETY WORKSHOP 9

NOVEMBER 2021

# PURPOSE

- Aviation = IDSS
- Spread across multiple NWS offices
  - Aviation Weather Center (AWC)
  - Center Weather Service Units (CWSU)
  - Weather Forecast Offices
- How does aviation fit into the WFO IDSS model?



# WEATHER READY NATION/ NWS PMO EVOLVE IDSS



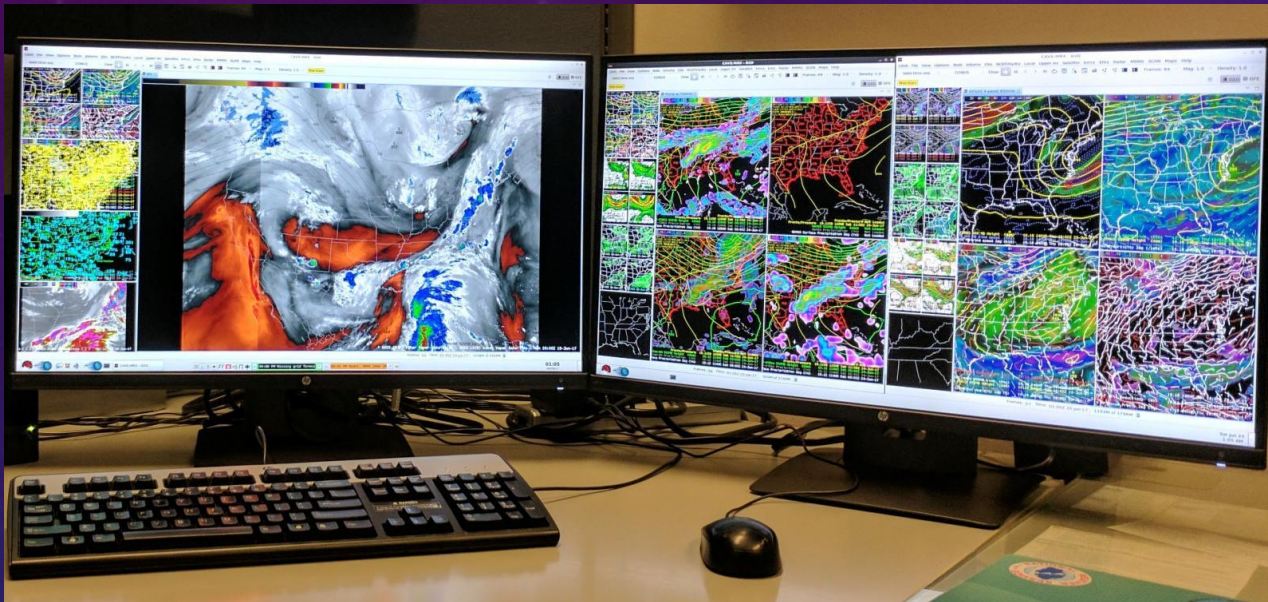
- Key Initiatives include:
  - Identifying IDSS and messaging opportunities
  - Establishing a higher level of baseline IDSS
  - Evolve from passive to active partner engagement
- PMO Evolve IDSS Initiative
  - IDSS Communities of Practice
  - Goal: Identify local and regional best practices and challenges to facilitate common national IDSS solutions

“Forecasting and IDSS cannot be separated into two distinct endeavors.”

--CR WRN Roadmap



# WEATHER FORECAST OFFICE (WFO)



- Aviation support
  - TAF
  - TAF coordination with CWSU (select offices)
- Can we be doing more? What about:
  - Partner engagement
  - Severe weather
  - Emergency preparedness
- Coming up:
  - How can we raise our baseline IDSS?
  - How do our Aviation Partners operate?
  - TAF best practices





KSGF 301724Z 3018/3118 VRB03KT P6SM OVC010  
FM302300 VRB03KT P6SM OVC013  
FM310400 VRB03KT 5SM BR BKN009  
FM310600 VRB04KT 3SM BR OVC007  
FM311500 21006KT P6SM BKN009

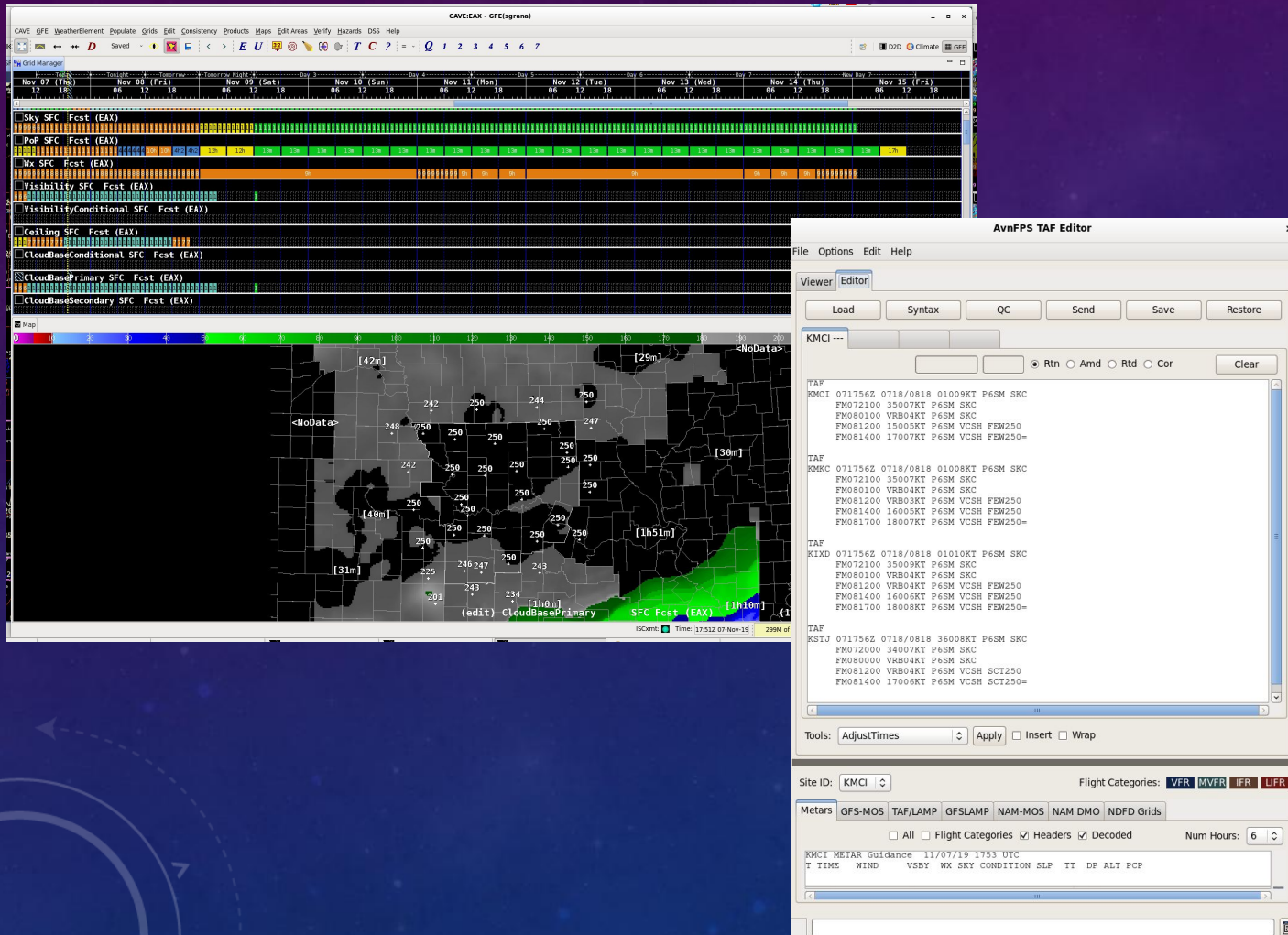
KCMI 301720Z 3018/3118 VRB03KT P6SM OVC035  
FM310000 VRB03KT P6SM OVC022  
FM311000 VRB02KT 2SM BR OVC007  
FM311200 VRB02KT 1SM BR OVC004  
FM311600 VRB02KT 2SM BR OVC006

# TAF “RULES”

- “Practically Perfect TAF” guidelines (COMET)
  - No more than 5 lines
  - Write to flight categories
  - Critical TAF period = first 6 hours
  - Limit TEMPO use to first 6 hours
    - Only use for changes in flight category
  - PROB30 and TEMPO should be short in duration
- NWS Directive 10-813
  - Not to exceed 6 lines (excluding TEMPO) except when absolutely necessary
  - Be aware of operationally significant weather for the airport
  - Be aware of amendment criteria
  - Include more detail in the first 12 hours of the TAF
  - VC may be used during any part of the valid period
    - 50% probability or higher
    - NOT in TEMPO or PROB groups
  - TEMPO groups do not exceed 4 hours
  - PROB groups are 6 hours or less
    - Only one PROB group allowed
    - Not used in first 9 hours of TAF



# DIGITAL AVIATION SERVICES (DAS)



- TAFs now “fall out” of the grids
- Easier, right?
- Still have to
  - Condense TAF to 6 lines (or less)
  - Consider operationally significant thresholds, CAC
  - Convey forecast trends
  - Publish on schedule
  - Amend when necessary
- VC may not be set to appropriate probability thresholds in the DAS
  - Chance POPs vs. 50% “rule”

# AVIATION USERS: PART 91 (GENERAL AVIATION)

- Non-scheduled
- Privately owned and operated
- Least standardized/restrictive
  - Crew rest requirements
  - Training





# AVIATION USERS: PART 135 (BUSINESS JETS)

- Commercial flights
  - Non-scheduled charter
  - Air taxi operations
  - Helicopters
  - “Compensation for hire”
- More stringent requirements
  - Training
  - Crew rest
  - Maintenance



# AVIATION USERS: PART 121 (AIRLINES)

- Major and regional airlines
  - Operate on a set schedule
  - Many use contract weather companies or their own meteorology group
  - Strictly regulated
- Drive many of the decisions/air traffic initiatives in the National Airspace System (NAS)





# TAKE OFF/ LANDING REQUIREMENTS

## Flight Categories

Flight Category	Ceiling (feet)	Visibility (SM)
VLIFR	< 200 and/or	< ½
LIFR	< 500 and/or	< 1
IFR	≥ 500 to < 1,000 and/or	≥ 1 to < 3
MVFR	≥ 1,000 to ≤ 3,000 and/or	≥ 3 and ≤ 5
VFR	> 3,000 and	> 5

## Critical Amendment Criteria - CAC

Flight Category	Impact
MVFR	≤ 3000 ft and/or ≤ 5 sm
Must File Alternate	< 2000 ft and/or < 3 sm
IFR	< 1000 ft and/or < 3 sm
Alternate Landing Minimums (airport dependent)	600 ft and/or 2 sm
Airfield Landing Minimums (airport dependent)	200 ft and/or ½ sm

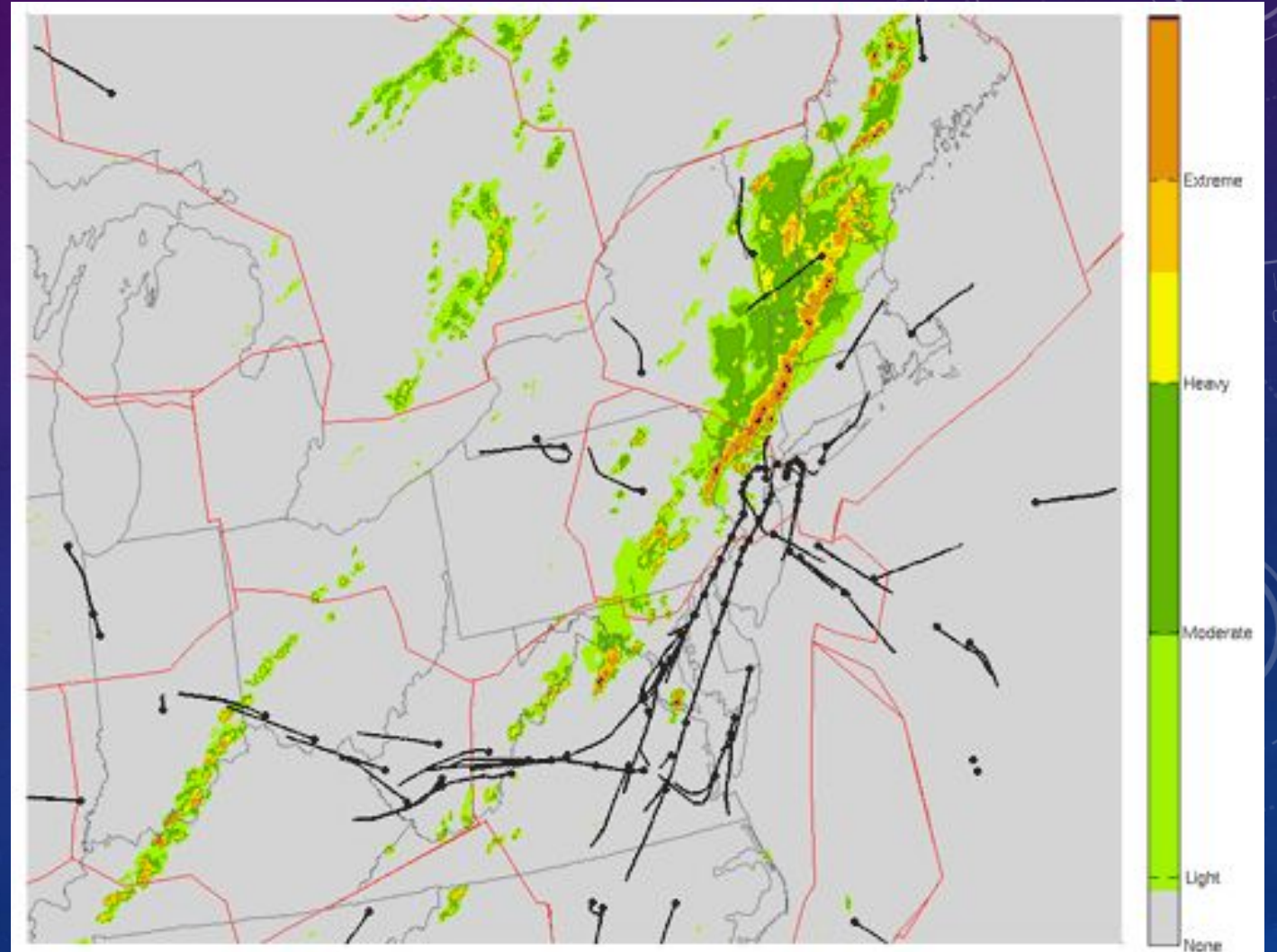
Increased fuel requirements

+/- 1 hour of ETA

**“1-2-3 Rule”**

# WHAT ABOUT CONVECTION?

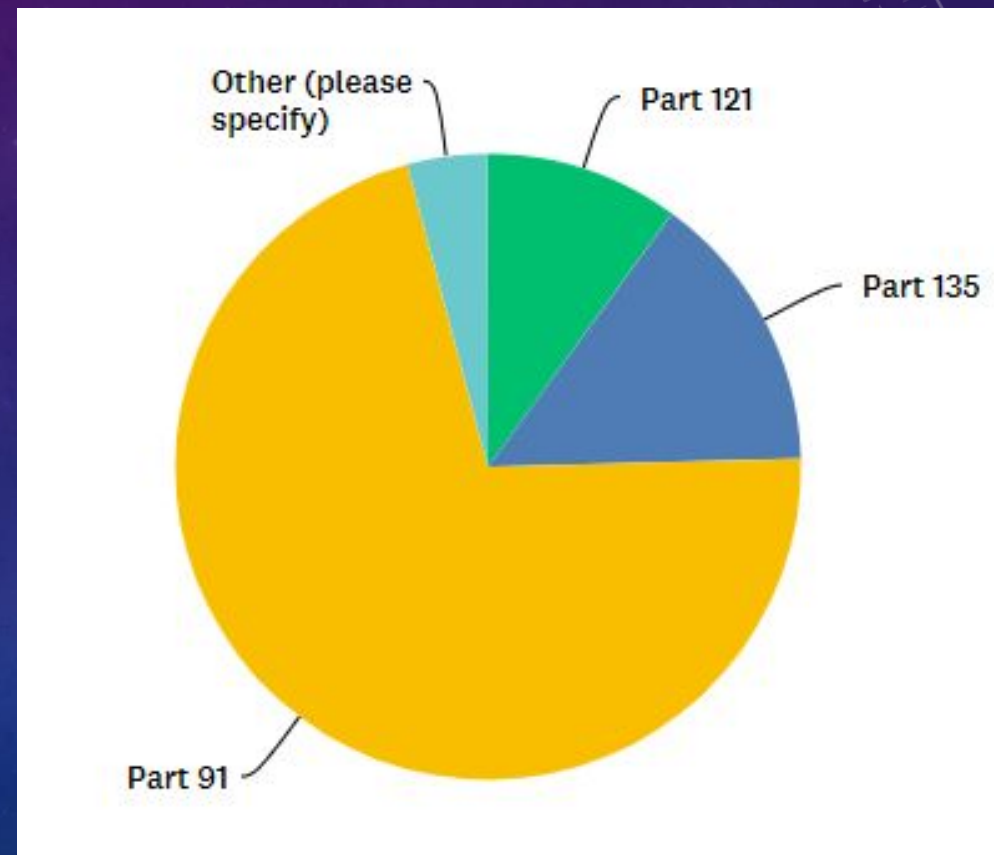
- Southwest Airlines (AMS 2020)
- Planned Arrival Fuel Weight (*average*)
  - 6,800 lbs -- VFR
  - 11,000 lbs – VCTS
  - 12,000 lbs – TSRA
- Planned Arrival Fuel Costs per Flight
  - \$2000 – VFR
  - \$3500 – VCTS
  - \$3650 – TSRA





# WE ASKED OUR AVIATION PARTNERS...

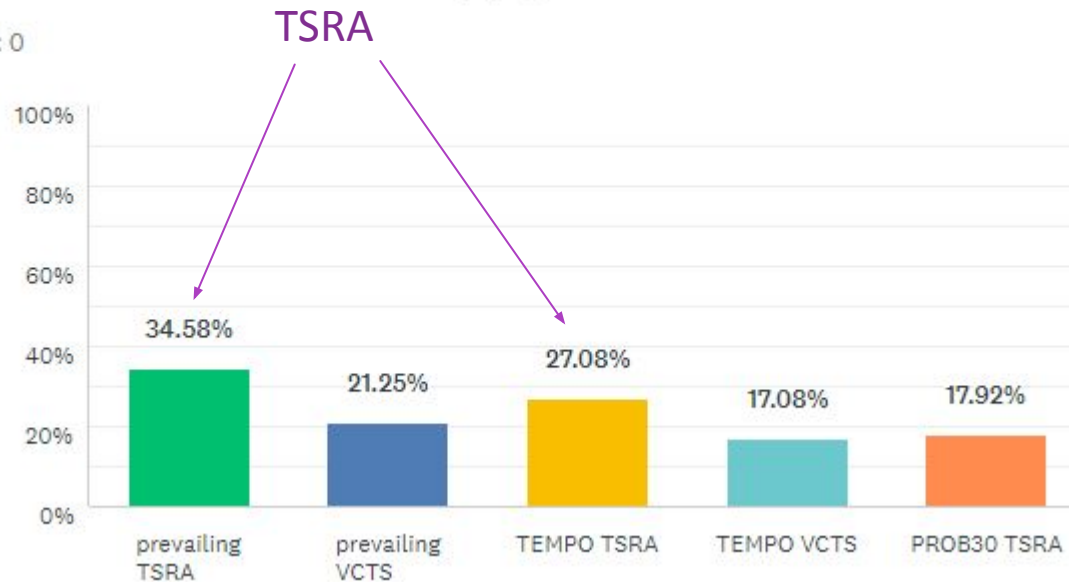
- Short survey about NWS TAFs
- Distributed to aviation partners in late January 2020
- 240 responses
  - Part 121
  - Part 135
  - Part 91



# WHAT TRIGGERS THAT EXTRA FUEL?

I must declare an alternate and fuel for that alternate if the following occur +/- 1 hour of ETA: (select all that apply)

Answered: 240 Skipped: 0

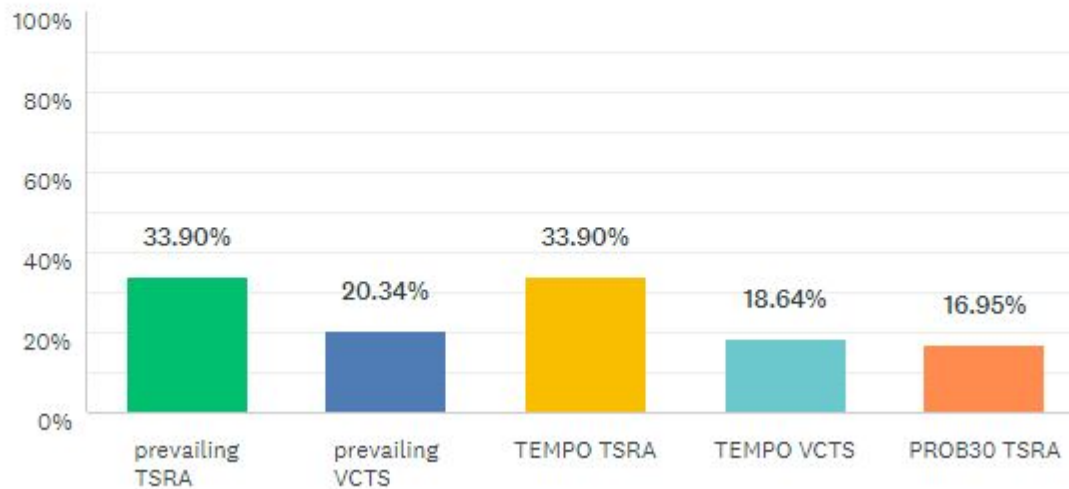




# EXTRA FUEL: PART 121 AND 135 ONLY

I must declare an alternate and fuel for that alternate if the following occur +/- 1 hour of ETA: (select all that apply)

Answered: 59 Skipped: 0



# EXTRA FUEL: AIRLINES ONLY

I must declare an alternate and fuel for that alternate if the following occur +/- 1 hour of ETA: (select all that apply)

Answered: 24 Skipped: 0



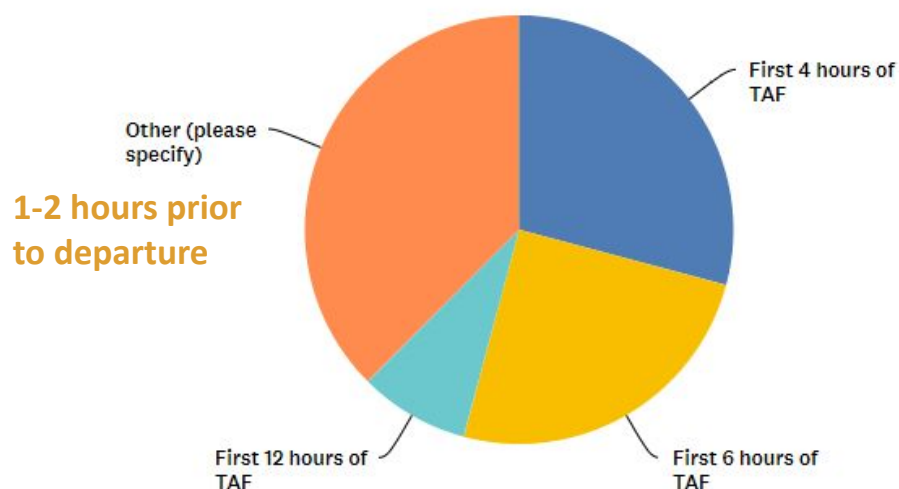
- TSRA has the greatest impact on users
  - More impact on airlines than other operators
- VCTS still triggers fuel impacts



# FLIGHT PLANNING: AIRLINES ONLY

What is the time frame when fuel decisions are being made for a flight?

Answered: 24 Skipped: 0

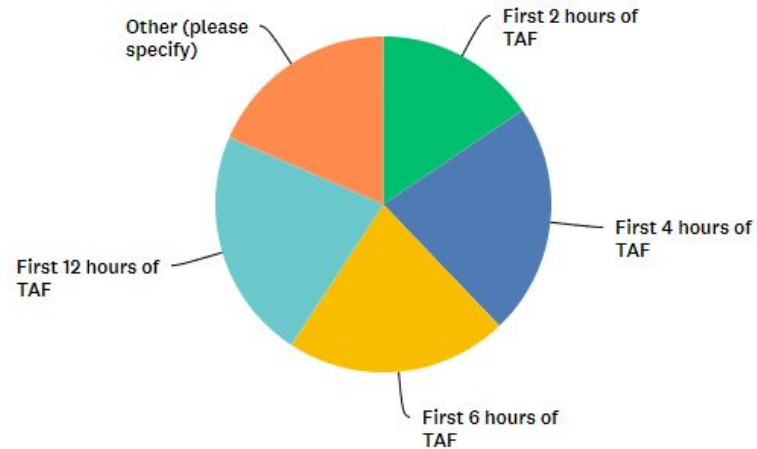


- Critical period of the TAF
- Fuel decisions are being made 1-2 hours prior to takeoff
- ZKC is 2-3 hours flight time from West Coast and East Coast
  - FIRST 5-6 hours of TAF = Critical period
  - Add your detail here!
  - Keep the TAF fresh
    - AMEND!

# FUEL PLANNING- PART 91 AND 135

What is the time frame when fuel decisions are being made for a flight?

Answered: 206 Skipped: 0



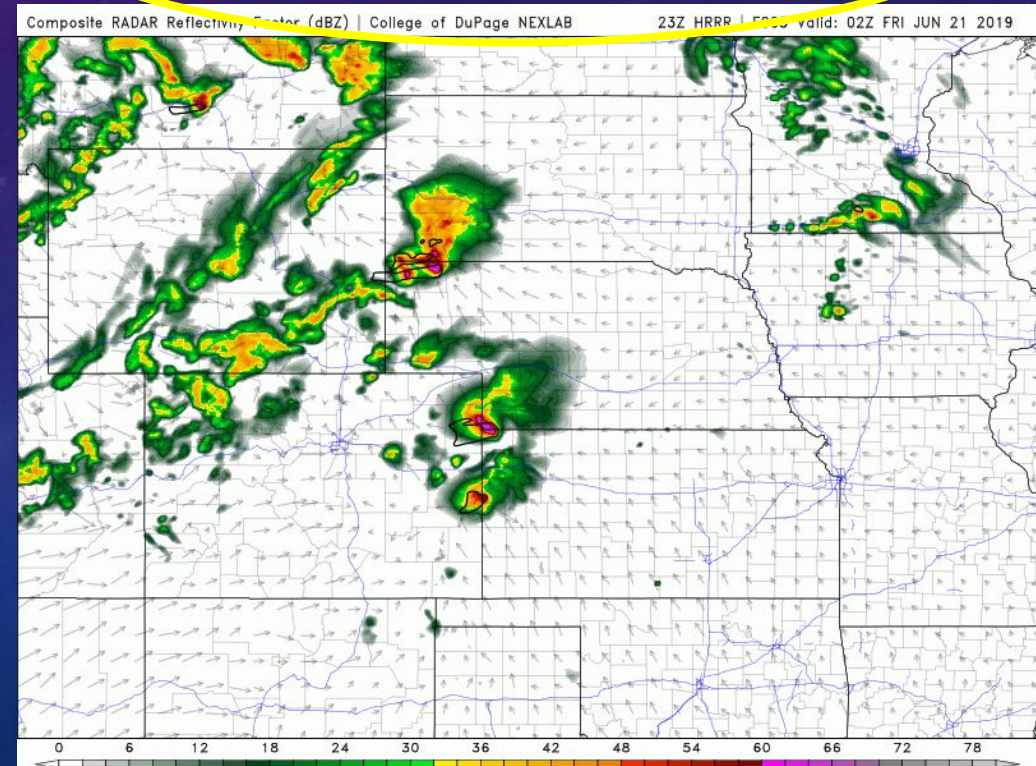
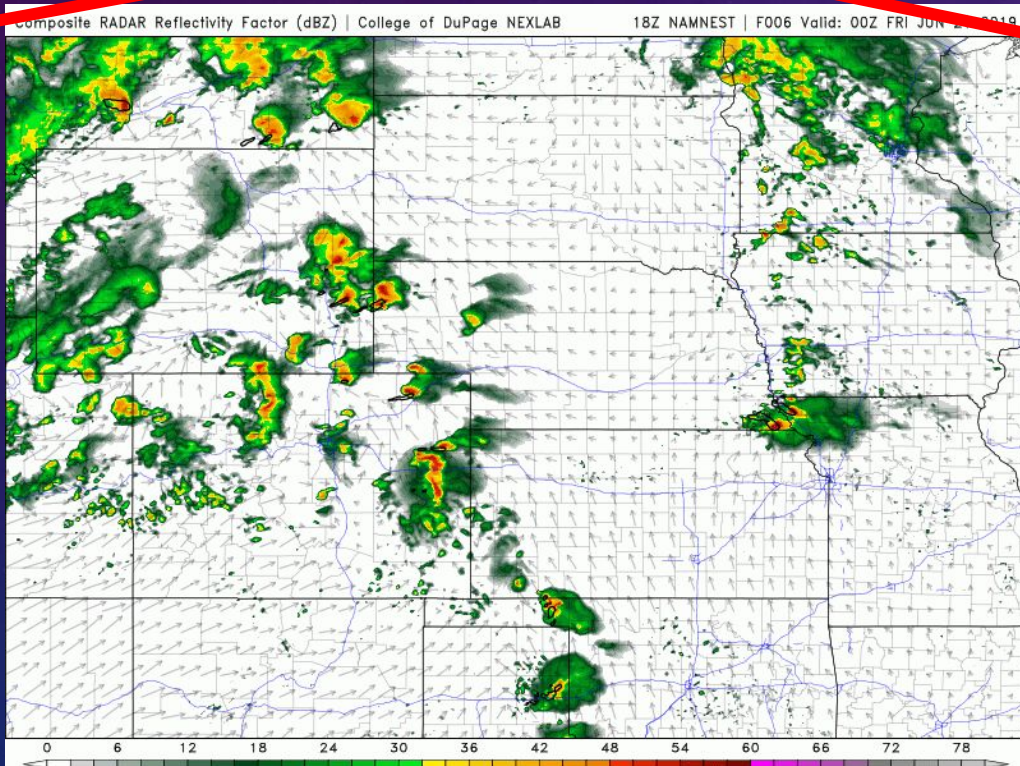
- Widely variable
- “Other” responses
  - “just before takeoff”
  - 24-48 hours before flight
- More than 50% within the first 6 hours



# WHAT ABOUT FORECAST UNCERTAINTY?

~~VCTS for 12 hours just to cover?~~

Write about it in the AFD and  
hope someone reads it?





# AVIATION WEATHER CENTER WEBSITE: AFD USE

- AFD page is among Top 10 most popular pages
- 4.5 million page views in 2019
  - Increased 15% from 2018 to 2019
- Average time spent viewing: 10 minutes
- Not much seasonal variability



NOAA AVIATION WEATHER CENTER NOAA NATIONAL WEATHER SERVICE

Local Forecast Go HOME ADVISORIES FORECASTS OBSERVATIONS TOOLS NEWS SEARCH ABOUT USER

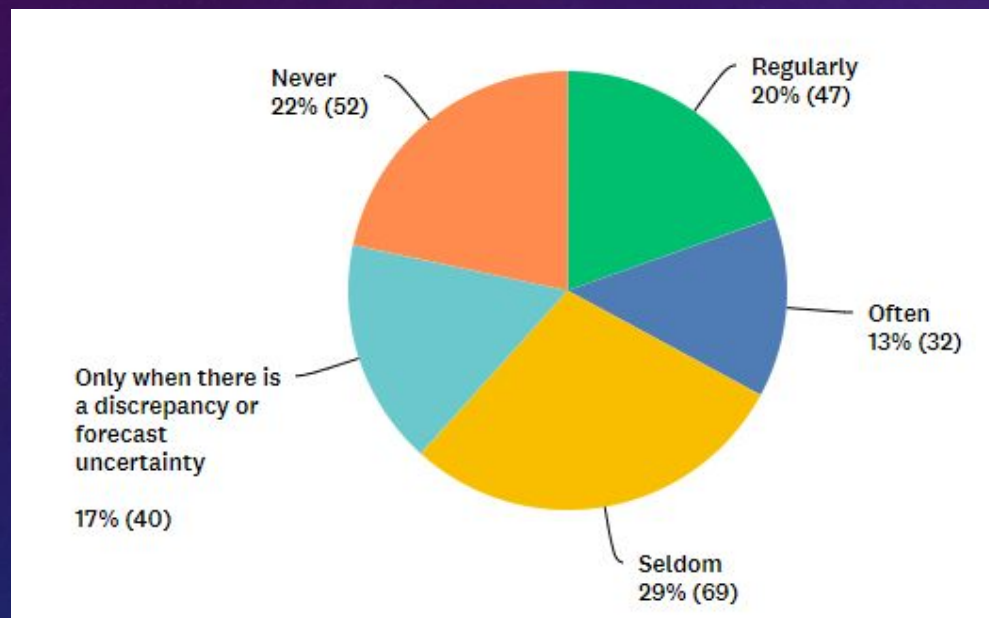
Aviation Forecast Discussions AFD Home Data Page Info

Click on site to access discussion

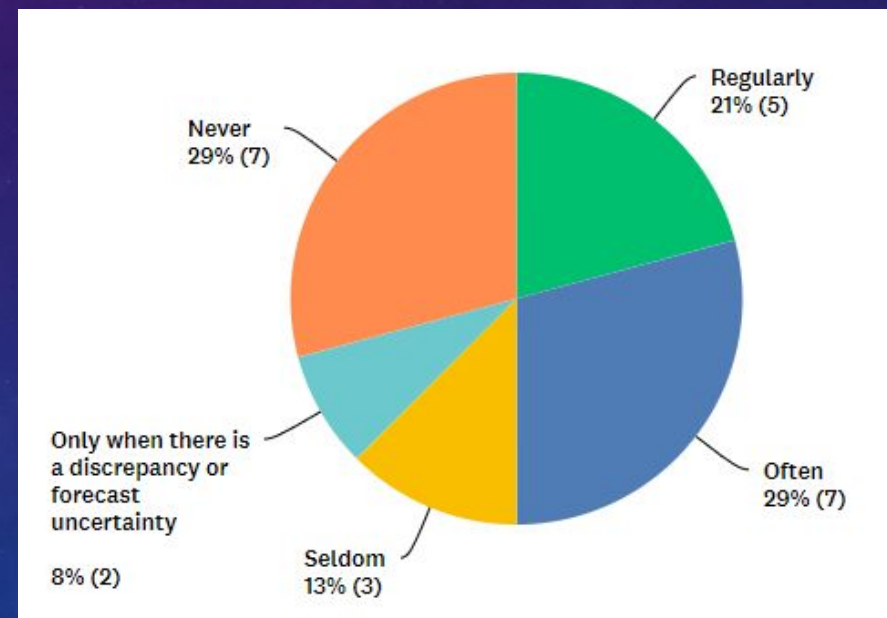


# HOW OFTEN DO THEY READ THE AFD?

All responses

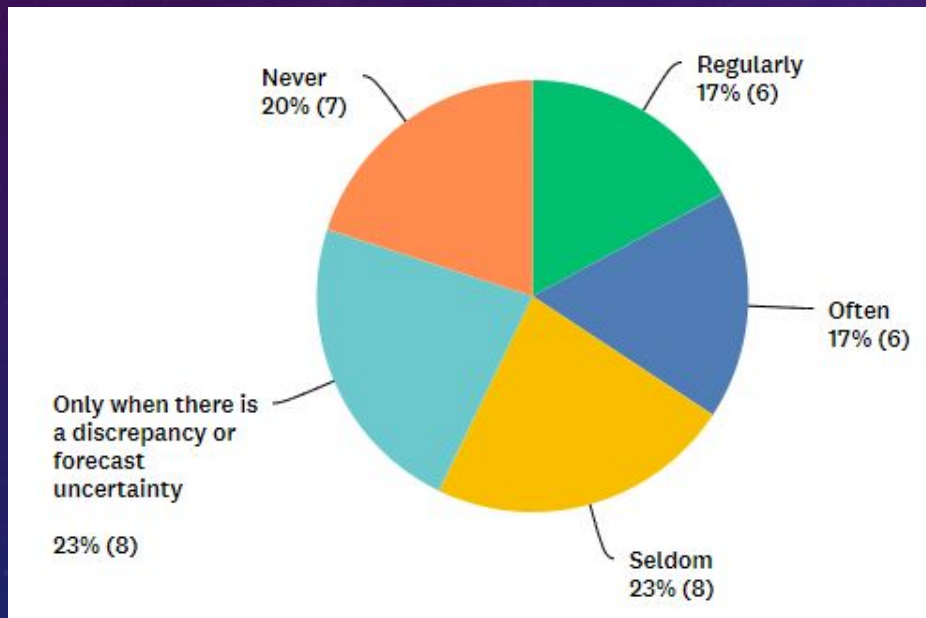


Airlines only (24 responses)

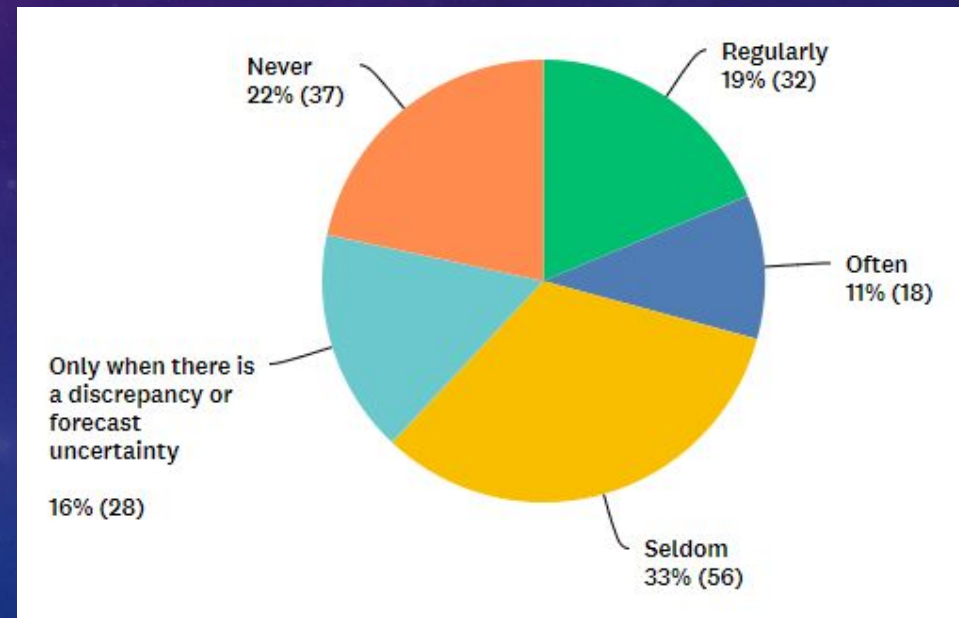


# HOW OFTEN DO THEY READ THE AFD?

Part 135 (35 responses)

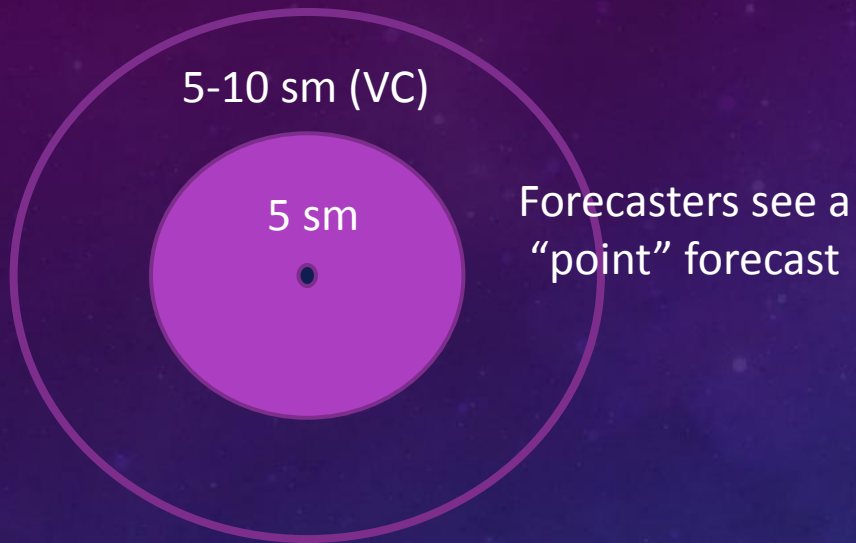


Part 91 (171 responses)



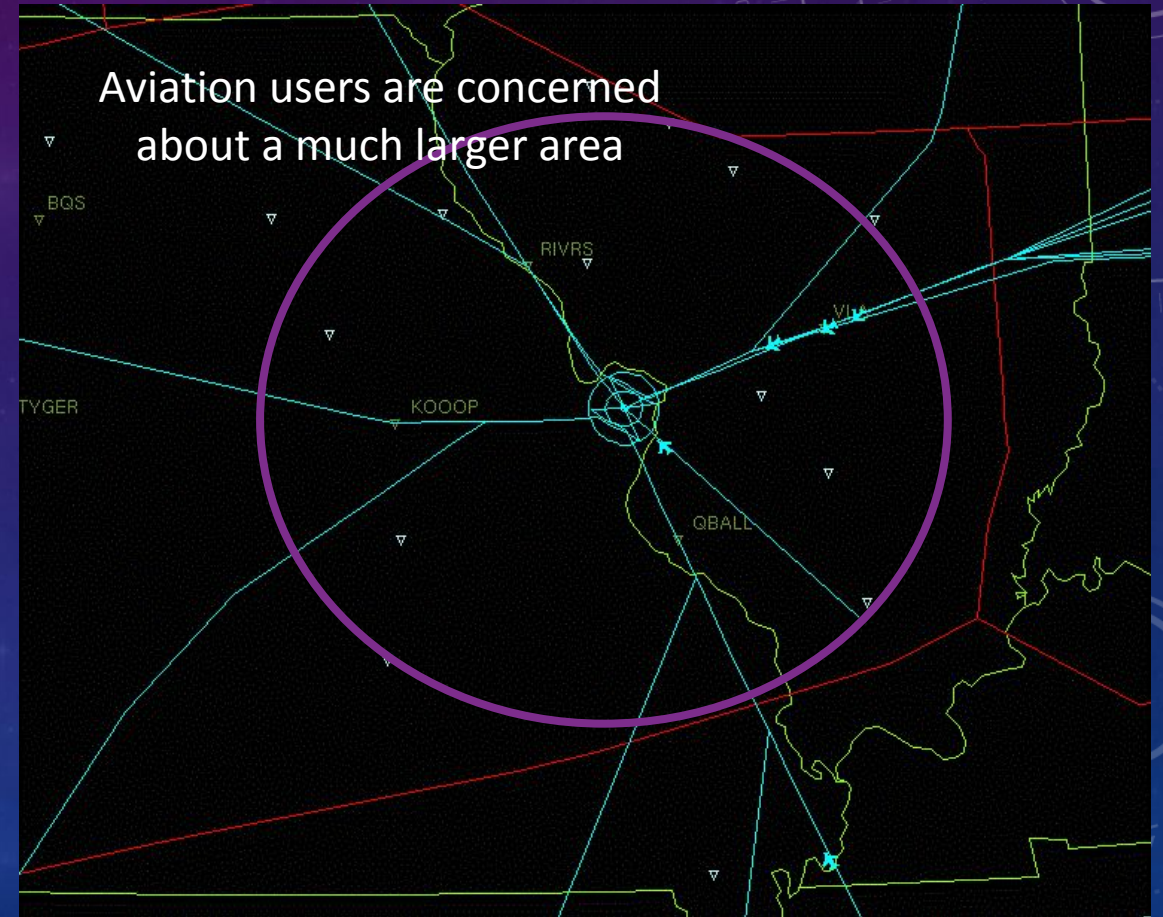


# DIFFERENT TAF PERSPECTIVES



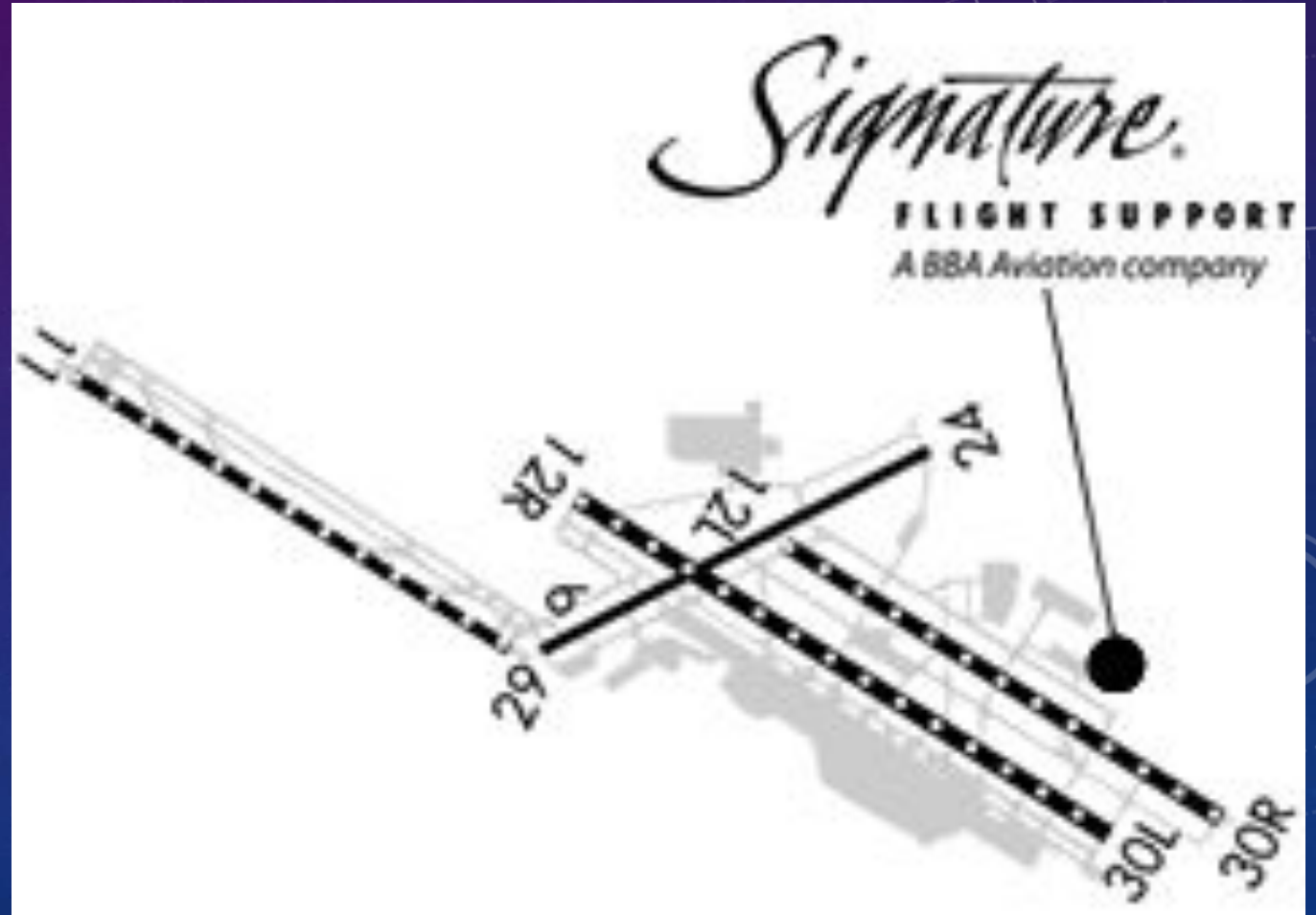
- Aviation users will “shop” the weather
  - They will look at multiple TAF sites
  - Looking for consistency
- Collaborated grids -> DAS -> More consistent TAFs!

**FORECAST CONSISTENCY IS KEY!**



# “OPERATIONALLY SIGNIFICANT”

- Impacts that are not obvious
  - Crosswinds
  - Lightning
  - Dense fog – RVR
  - Vulnerable wind configurations
  - Event traffic (fly-ins, eclipse)
  - Snow removal
- Build a relationship with airport & tower





# TAF BEST PRACTICES

- Stick to the 6-line limit
- Critical Period is the first 6 hours
  - Most detail/effort goes here
  - TEMPO (no more than 4 hours)
  - AMEND!!!
- Use DAS to ensure forecast consistency
- Limit VCTS to short periods (4-6 hours or less)
- Use the AFD to convey uncertainty
- Be aware of “operationally significant” thresholds

Station\Hour	OBS	19Z	20Z	21Z	22Z	23Z	00Z	01Z	02Z	03Z	04Z	05Z	06Z	07Z
[REDACTED]	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR
	SE-6KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT	SE-8KT
[REDACTED]	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR
	SE-6KT	VRB-6KT	VRB-6KT	VRB-6KT	VRB-6KT	VRB-6KT	VRB-6KT	VRB-6KT	VRB-3KT	VRB-3KT	VRB-3KT	VRB-3KT	VRB-3KT	VRB-3KT
[REDACTED]	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR
	SE-4KT	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS	VCTS
[REDACTED]	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR
	E-5KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT	E-6KT
[REDACTED]	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR
	N-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT	NE-5KT
[REDACTED]	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR	VFR
	NE-5KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT	N-6KT

**Terminal Impact Graphic**  
**Valid: Thru 07Z**  
**Next Update: 270100Z**  
*No Updates 270230Z-271200Z*

**FOR SITUATIONAL AWARENESS. NOT TO BE USED FOR FLIGHT PLANNING PURPOSES.**  
 [ ] INDICATE A TEMPO CONDITION